The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Water Softening

THE subject of water softening seems to be among the scientific topics on which technical men become most loquacious. Why this should be so could be a theme for the industrial psychologist. But there is perhaps a more simple reason. Water softening is an operation practised in most industrial works wherein water is a primary raw material; since steam is so widely employed as a source of heat and power, there are few industries in which water is unimportant. Nearly every works chemist and engineer, therefore, has more or less experience of operating water-softening installations and can find something to say about the processes used in his works. This, however, would not of itself explain the wealth of the literature that exists. If the water-softening plant worked smoothly and gave no trouble, no one would find anything to say about it. The inference consequently is that water-softening plants are very far from being trouble-free, and as a result there is a great deal to say about them. Hence it was that the meeting of the Society of Chemical Industry—the first meeting this season of the London Section—which discussed the subject was very well attended and lasted well through a long afternoon.

It is useful to indicate why the operation should be so difficult. In the first place there are wide differences between one water and another, necessitating corresponding differences in treatment. Secondly, the composition of water is by no means constant, so that a continual watch must be kept on the quantities of reagents used and the conditions of purification. Thirdly, the quantity of deleterious substances to be removed is very small indeed, and delicate reactions involving concentrations of the order of 0.02 per cent. must be brought to completion within a limited time. Fourthly, and this is highly important, the extent to which purification is needed depends on the use to which the water is to be put. These demands fluctuate from a modest reduction in hardness to the production of virtually distilled water. An important point is that the behaviour of dissolved salts in the boiler depends upon the pressure in the boiler; water that is suitable for pressures of 100-250 lb., may have serious consequences on boilers operating over 350 lb. Has there been assembled in convenient form a summary of our knowledge of the effect of temperature and pressure on the reactions of the substances contained in water? We commend that subject to the attention of chemists interested in the dissemination of knowledge.

The number of water-softening or purification processes is considerable. The lime and the lime-soda processes are the most widely used, and within limits serve their purpose. The base-exchange processes using natural or artificial zeolites come next in popularity and are sometimes combined with lime or lime-soda. The disposal of spent sodium chloride solution offers no difficulty in large towns, but may be serious in country districts. Here a storage tank should be used from which the liquor is allowed to trickle out. An important point is that base-exchange materials must not be used as a filter or they will lose their efficacy; where there is the least trace of solid in suspension the water should be pre-filtered. While on the subject of zeolites, it is well to mention the important point brought out in the discussion that water of zero hardness from this process may still have marked corrosive action on metals. Dr. Vernon pointed out that in this process the scale-forming substances, which would form a protective coating, were replaced by corrosive substances. Chemists present appeared unable to decide whether this corrosion was due to carbonic acid or to differential oxidation. Where hot water thus softened is stored—as, for example, in the laundry industry or in boiler feed tanks—rubber or plastic lining is advisable. The corrosion is only observed above 140° F. and falls off after about 180° F., at which temperature both oxygen and carbon dioxide are evolved from solution. To these methods of softening may be added that of purification in the sense of production of distilled water, free even from dissolved gases, for boilers operating above 400 lb. pressure.

To mention here all the interesting points that arose from this meeting is manifestly impossible. No detailed analysis can be made of the blow-down process discussed with admirable impartiality by Mr. Donnelly, of purification for laundries (Mr. Harwood), for high-pressure boilers (Mr. Henson) or for public water supply, an example of mass chemical engineering (Mr. Rawson and Mr. Streatfield), nor yet even of the admirable prologue and epilogue of Dr. Parker. The newer base-exchange processes were not described in detail, but the chief impression carried away from the meeting was that chemists generally are looking to these newer processes to relieve them from the difficulties experienced in the older processes. The resin-exchange process described before the Society by Adams and Holmes in 1935 is based upon a synthetic resin derived from tannins or polyhydric phenols which removes the bases, followed by an acid-exchange resin derived from phenylenediamine which introduces an entirely new principle by removing the acid radical, the two together yielding water with less than 1° hardness. Chemists are looking to the development of this process to place water softening on a completely satisfactory basis, producing practically distilled water from which no scale would be produced, with consequent improvement in fuel consumption for all operations that require water to be heated.

NOTES AND COMMENTS

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

Exports and Isolationists

FOLLOWING the Lend-Lease Agreement and the British Government's undertaking that no materials of a type the use of which is being restricted in the United States on the grounds of short supply, and of which we obtain supplies from the United States, either by payment or on Lend-Lease terms, will be used in exports except in special cases, it has become most important to allay any suspicions by the American public that Britain is seeking in any way to avoid the obligations of this undertaking. Such suspicions, if they gain ground, would clearly be most harmful to Anglo-American relations and might impede American assistance to Britain. The fact that exports of the classes of goods falling within this undertaking are controlled under the export licensing system robs the suspicions of any real foundation in fact. Nevertheless, there is strong evidence that isolationist opinion in America has used the fact that advertisements of this class of goods are still appearing in British periodicals circulating overseas to fan these suspicions. Such advertisements have also aroused unfavourable comment in many non-isolationist circles. The Government does not desire to restrict goodwill advertising, but in view of these facts it is most desirable that it should be made clear to American opinion that the advertisement of such goods does not necessarily mean that they are being offered for export. It is for this reason that the notice above is given special editorial prominence in this issue of THE CHEMICAL AGE. It will continue to be published week by week in our advertisement pages, until further notice, as a counter-measure to reports circulated by the enemies of Britain.

The Blow-Down Process of Water Purification

THE meeting on Water Softening, the subject of our leading article this week, brought out many points and difficulties in water purification. Mr. Donnelly's paper on blow-down return softening dealt with a system which is in use at several works where sodium carbonate is put into the feed water and precipitates the salts, causing permanent hardness in the feed-water tank. The excess then enters the boiler with the feed water where it is converted into caustic soda to the extent of about 50 per cent. of the quantity added, CO_2 being evolved with the steam. Whilst Mr. Donnelly has noticed no corrosion from the CO_2 in the steam it is evident that some may occur in pipe lines or in the engine cylinders or on turbine blades. Since hot blow-down water is fed into the feed tank and thereby heats the feed water, a certain amount of the temporary hardness is also removed at this stage. The author does not consider that the heat added to the feed water should be regarded as an asset to the process because the same amount of heat can usually be obtained from exhaust steam or from other sources of waste heat. Where the feed water is hard the process fails because of the very large amount of blow-down water that has to be added. Theoretically 29 gallons of blow-down water must be returned to the feed-water tank for every 10° of water hardness per 100 gallons of raw feed water. In practice the amount required is somewhat less than this. The advantages of the process, where it is suitable, are the elimination of lime, the blowing back of the boiler sludge into the feed tank whence it can be removed, and the fact that as long as the sodium carbonate concentration is maintained at a reasonably correct figure the process of feed-water softening will work satisfactorily. The total alkalinity in the boiler should be of the order of 70°.

Standard Methods of Reporting Results

AN important point made by more than one speaker was the divergency in the methods of reporting water hardness. The method used may be parts per 70,000, which is usually known as English degrees of hardness, parts per 100,000, or even parts per million. Whereas most chemists report the hardness in terms of calcium carbonate in any of these three notations, quite frequently on the Continent workers report in terms of CaO. Again, the oxygen equivalent of water is usually expressed in terms of oxygen required in parts per 100,000; in Germany, however, it is frequently found that this figure is reported in parts of $KMnO_4$ per 100,000. Is it not time that some uniform method was used generally throughout the world? We suggest that the Society of Chemical Industry and the D.S.I.R. should between them set up a method always to be used in publication in this country. We do not doubt that the chemical press would follow whatever lead was then given, and it should not be difficult to get the same standards adopted in England and in America. This standard would obviously soon spread to the rest of the world.

Water Purification Difficulties

SILICA is a particularly awkward impurity in industrial water. It is found to form a very hard scale and we have heard it suggested that silica alone will cause but little difficulty if calcium is absent. If calcium is present, calcium silicate is formed which produces a scale hard as enamel. Up to some 350 lb. boiler pressure, silicate scale can be prevented from forming by the addition of phosphate, though whether this is not rather due to the effect of phosphate on the lime we are uncertain. The difficulty with silicate is not confined to its scale-forming propensities. It has been found to cause the erosion of turbine blades, being carried forward in suspension in the steam. Another difficulty of some importance lies in the disposal of spent lime sludge when lime purification is resorted to on a large scale. It has been used for removing SO_2 from the exit gases from power stations, for face powder paste, for tooth paste, for spreading on the land for agricultural purposes, and on occasion it has been reburned and used over again. Reburning, although it is the most logical use, appears to involve the highest costs. Yet another difficulty lies in preventing precipitation of lime salts later in the system, after the purification plant proper. When base exchange materials are used following a lime or lime-soda process, these salts may be deposited on the base-exchange material, and cause it to lose its value. A suggestion made at the recent Society of Chemical Industry meeting was that temporary hardness only should be removed by lime and the permanent hardness by base-exchange materials; but it seemed that the real solution was to add some 4 ounces of sulphuric acid per 1000 gallons of water, to reduce the alkalinity to a low figure, and then to pass the water through marble-filled towers before use to ensure that it should never be acid.

Wholesale Prices in September

IN contrast with the lack of movement between July and August, the index number for wholesale prices in September, as measured by the Board of Trade, rose from 153.2 to 154.3, an increase of 0.7 per cent. The food index was 0.9 per cent. higher, while that for industrial materials and manufactures rose by 0.6 per cent., or from 156.8 to 157.7 (1930=100). For chemicals and oils the figure was 128.3 (against 127.9); iron and steel and non-ferrous metals remained steady at 181.2 and 123.7 respectively. Large increases in the price of textiles other than cotton and wool (in the industrial group) and of barley (in the food group) were principally responsible for the over-all increase. In the chemicals group the prices of iron sulphate and aluminium sulphate were increased by about 28 per cent. and 11 per cent. respectively, but owing to their small weighting within the group, there was only a small increase in the group index figure.

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Safe Practice in the Chemical Laboratory

III.—Avoidance of Explosions

by JOHN CREEVEY

It is easier to give advice about avoiding accidents than it is to prevent them, especially in a laboratory where students are working, or in the works laboratory when there are persons new to its environment. Nevertheless, all common laboratory accidents are preventable; in most cases they are the result of careless neglect of simple safety rules, and the victim may or may not be responsible, though often he is suffering from his own neglect. There are exceptions in an experimental laboratory, where unforeseen circumstances develop from inadequate knowledge of the course of a particular reaction.

* * *

There are some simple rules of safety which must not be ignored. For instance, distillations should never be carried out in closed systems without safety vent; inflammable solvents such as ether, petroleum ether, carbon disulphide, acetone, alcohol, and benzene, must not be handled too close to a naked flame; distillations of such solvents should be done with all care; if it is necessary to boil inflammable solvents, this operation must be done in a flask provided with a reflux condenser. These are simple precautions against explosion and fire, but are frequently ignored, and consequences have been serious.

* * *

Due care should be exercised in handling long lengths of glass tubing, especially when removing such lengths from the storage rack. Care is likewise needed with rubber stoppers when inserting glass tubing, thermometer stems, or the side arm of a distilling flask. The task is made much easier and safer if both glass and rubber are first moistened with water or alcohol. Moreover, it is wise to hold the glass within one inch of the end which is to be inserted in the stopper, and not six or so inches away; a gentle twisting motion should be applied. When removing a rubber stopper from glass tubing, it is sometimes safer to cut the rubber away from the glass if it has become firmly stuck. All corks and rubber stoppers should be bored to the correct size for the glass tubing which is to be used, and the work will be easier and give a cleaner cut hole if the borer is sharp and undamaged at the cutting edge.

* * *

Reagents cause serious accidents if they are handled carelessly. Bromine will inflict painful burns if it comes in contact with the skin, and so will phosphorus. More than one accident has been caused by the careless pouring of bromine into a stoppered funnel, while the latter was being held in the hand. It is safer to make additional use of an ordinary funnel in this task, and to hold the stoppered funnel in the clamp of a retort stand; this is cited as a case of being careful to extreme limits, which is sometimes advisable according to circumstances and environment Cyanides are not only poisonous to handle; on exposure to moist air they liberate hydrogen cyanide, and such a task as pulverising them should be done under a hood where dust and fumes will be carried away safely. Many chemicals are injurious to the skin; therefore make use of rubber gloves if the need is indicated.

* * *

Sodium must be handled with care; it will sometimes ignite spontaneously in the air, and for this reason should be cut whilst still under the surface of naphtha. Phosphorus, likewise, should be cut under water. Reactions which involve the use of metallic sodium should never be heated on a water-bath; it is safer to use an oil-bath, or a sand-bath, for the flask may break from some unforeseen cause Such an accident, it is true, happens but rarely, but when it has occurred the consequences have warranted this cautionary measure. Residues of sodium metal should be destroyed by the addition of alcohol before being thrown away; it is well to keep a bottle containing alcohol for this purpose in a laboratory where sodium is often used. Dangerous residues thrown down the sink may accumulate to dangerous proportions in the trap; this was the case in a laboratory where small quantities of a particular nitro compound were frequently made in the course of routine analysis, for unexpectedly the trap exploded with fatal result when it was being removed to ease a stoppage.

* * *

On prolonged exposure to the air, ethyl ether is gradually oxidised with the formation of peroxides which are highly explosive. The explosion is most likely to occur towards the end of an evaporation with ether containing these peroxides, and their presence may be unsuspected. They can be destroyed by shaking the ether with a weakly acid solution of ferrous sulphate before use; it is quite a simple precaution, and one which will avert a serious explosion. Only recently was this danger of peroxide formation again stressed in one of the chemical periodicals. A gallon can of isopropyl ether had been stored on the top shelf of a laboratory storeroom for about four years, during which time about half the contents had been used. For the last year the can had slowly corroded in places unobserved, and ether had worked through the corroded points to come in contact with the air and produce a whitish-yellow deposit close to the leaks. This was not noticed until occasion arose for someone to step between the shelves, and then there was an explosion. This was happily not attended by serious results apart from numbness of the limb which was close to the can at the moment of the explosion and also a crater about 4 cm. round and 1 cm. deep in a hard pine-wood floor, to which some of the whitish-yellow deposit had fallen to become detonated there by being trodden on.

* * *

Of recent report also was an explosion which occurred in washing reclaimed silver nitrate crystals with ethyl alcohol, and the result was the loss of two fingers to the laboratory worker. The alcohol washing was used to remove adhering dissolved impurities from the crystals with the minimum waste of the silver nitrate, and had been done 40 or 50 times before without mishap. The explosion took place when the worker, holding a beaker containing some of the washed crystals, touched them with a spatula. It appeared on investigation that silver fulminate had been formed by the interaction of silver nitrate, nitric acid, and ethyl alcohol, and that this detonated when its presence was unsuspected. Possibility of the formation of fulminate had been recognised in using alcohol for washing the crystals, but tests had shown that the amount of nitric acid present was normally insufficient to give trouble with the amount of alcohol used. For unexplained reasons the balance of conditions had become changed, and fulminate was formed with the result reported.

* * *

Makeshift contrivances used in supporting apparatus lead to accidents more often than is realised. It is well to remember that a condenser clamp used on a retort stand makes a universal joint, and greatly assists in the proper alignment of apparatus. If it becomes necessary to build up a support from the level of the laboratory bench, this should be done with bricks, for these give a solid structure by their weight alone. It is well to have a few good clean bricks—preferably blue Staffordshire or engineering bricks—in every laboratory, to be used in " building-up " or for " weighting " a retort stand unduly loaded.

The demand for mica in American industry is likely to increase, according to the India Government Trade Commissioner in New York. In 1939 the United States took about 7,759,300 lb. of India's total exports of approximately 19,893,000 lb.

Association of British Chemical Manufacturers

Co-operation With the Government

THE 25th annual general meeting of the Association of British Chemical Manufacturers was held in London on October 9, under the chairmanship of Mr. R. Duncalfe. In moving the adoption of the annual report for the year ending May 31, 1941, the chairman began by remarking that the report was confined to those items necessary as a record of events; as a picture it had to be incomplete.

"The Council," continued Mr. Duncalfe, "has been strengthened during the past twelve months by the addition of three new members—Messrs. T. R. G. Bennett, A. D. Daysh, and H. Jephcott. It is a matter of some pride to us that so many past and present members of council are filling key positions in the Government service. They serve to cement our close and long-standing relationship with Government departments. This relationship has continued to be a prominent feature of our year's work and has proved mutually helpful in developing informed policy. The Association continued throughout the year, and still continues, to second our general manager to the Government service.

"The supply of man-power required to maintain essential production has become a problem of increasing stringency during the year under review, and while steering clear of those questions of wages and conditions of service which under our constitution are outside our province, we have maintained close touch with the Association of Chemical Employers and the Drug and Fine Chemical Manufacturers' Association in regard to those aspects of man-power supply which affect production; we collaborated with the chairman of the Chemical Control Board in the arrangements which led to the establishment of the Chemical Industry Labour Supply Scheme. The chemical industry was the first industry to have its own labour supply scheme within the framework of the Essential Work Order and the regional committees have commenced their work. The industry owes much to Mr. Bain for his untiring efforts and ability, as a result of which the scheme was successfully launched. A serious responsibility rests upon the industry to see that essential production is maintained with minimum man-power. An important avenue of approach to this problem is by substitution of women; it is hoped to issue, at an early date, a memorandum on this subject which has been compiled in co-operation with the Association of Chemical Employers and Imperial Chemical Industries, Ltd., and which will, we trust, prove useful to the whole of the chemical and allied industries.

Mr. Roger Duncalfe, retiring chairman of the A.B.C.M.

"Arising out of the policy of the Government in regard to concentration of industry, a detailed inquiry on production in the chemical industry led your Council to accept the general view of members that, having regard to present conditions and apart from a few special cases, there was no unnecessary duplication in this respect and this view was communicated to the chairman of the Chemical Control Board."

Mr. Duncalfe then expressed his gratitude to the staff, particularly Mr. Drake and Mr. Holden, for their loyal support. He also expressed his gratitude to Mr. Wallace, the president, and to the Council for their constant support and help during his years of office. To the vice-chairman, Mr. Merriam, his special thanks went out.

The Association and the Future

"Perhaps," resumed Mr. Duncalfe, "you will forgive me if in leaving the chair I attempt to take a look forward; the future must remain largely obscure under the fog of war, but I am confident that the Association can do and will continue to do much in its own sphere to further the national effort. It is possibly at that point that we must be most intensely alive and be ready for reconstruction; the nation will then call urgently for leadership, imagination, and experience in the industrial sphere and I feel that the chemical industry will be called upon to play a leading part; even now it is not too soon to plan ahead and prepare ourselves for the task. With reasonable good fortune we ought at that time to have an extremely capable staff and our Council will provide us with the requisite leadership; included upon it we shall have a number of men fortified by the experience they have gained in Government service and well versed in the problems of industrial co-ordination. It must be said that the plethora of trade organisations, independently controlled, but frequently overlapping, presents a problem to many of us; if more unity, greater clarification and increased co-ordination could be achieved, a more powerful influence in the industrial sphere would result.

"The A.B.C.M., which is in effect a group association, is worthy of close study in relation to post-war development; personally I believe that in its constitution we have a plan which might well be a guide for the industrial structure of the future. It provides for the central co-ordination of a large number of sectional groups, autonomous in their own spheres; it is a suitable medium through which the Government can with confidence convey its broad policy and which will provide the machinery for its implementation; it might well evolve a separate council for the planned export effort which must be a feature of the post-war period, and which to be successful must always be based on a planned economy at home; even labour questions may well come within its scope, because I cannot but feel that the separation between the trade association and the employers' association is becoming somewhat artificial and is likely to become more so as time moves on. However, these are matters which may only be touched upon lightly to-day.

"The time has come when I lay down the responsible office you honoured me by entrusting to my charge; I could have wished to have held it in happier times, but I have found the work of intense interest and if, as I hope, I can feel that during my tenure of the chair, the usefulness of this important association has been maintained, I shall be well rewarded."

Points from the Report

Work was well advanced on a revision of the Association's main directory when it was decided on security grounds that its issue was undesirable. The Council felt that to issue the directory in incomplete form would not only be inconsistent with its high reputation for accuracy, but would be definitely misleading if taken as an indication of the scope of the British chemical industry.

The Association has received regular returns of applica-

tions for import licences in respect of chemicals and, where necessary has, as the result of inquiry among members interested, provided the Supply departments concerned with information for their guidance in dealing with these applications. As the result of an announcement that the Treasury was considering the position of import duties in cases where the practical value of maintaining the duties was in some doubt (*e.g.*, where imports were all directly on Government account), the Association has asked that it be consulted in the course of the deliberations. The Treasury announcement included an indication that industry would be consulted and the Association will take the opportunity of stating the claims of the fine chemical industry for special consideration, as a key industry, as well as making the case on general grounds for chemicals subject to duty under the Import Duties Act, 1932.

Supply of Laboratory Chemicals

Directly or indirectly, even such a widely diversified field as that of fine chemicals has become very largely influenced by control and other restrictions, and the scope for initiative measures by this section of the Association has been correspondingly reduced. The supply of laboratory chemicals has been a matter of some concern to the manufacturers and dealers and to the Ministry of Supply, not so much because of acute shortage but to the end of ensuring that essential requirements were not jeopardised by unrestricted purchasing all round. The Association, with the scientific bodies representative of the consuming laboratories, is therefore co-operating with the Ministry of Supply in the formulation of an appropriate scheme of supervision.

Early in 1941, all coal tar products were brought under statutory control at the request of the tar distilling industry, whose recommendation that Major T. Knowles be appointed controller was accepted. The principal Order was essentially an enabling one and the year has seen its implementation by varying forms and degrees of control of specified products, according to their differing circumstances.

The effects of E.P.T. in limiting research and development were taken up through the Federation of British Industries, which was provided with information for use when opportunity arose with the Treasury, to show the position of the fine chemical industry as an industry specially protected by the Government and whose progress depended on intensive research and development.

Completion of "Toxic Gases" Series

The Quarterly Safety Summary has been continued but in a necessarily somewhat abbreviated form. The twelfth monograph in the series of "Tests for the Detection of Toxic Gases in Industry," namely, the lamp test for organic halogen compounds, was issued during the year, thereby completing the series.

The Association was invited to nominate a representative to the War Production Committee of the Federation of British Industries which was formed to assist the Federation's representatives on the Advisory Committee to the Production Executive of the War Cabinet.

Many cases of exclusion and interpretation under the War Risks Commodities Scheme have been taken up for members. The Association co-operated with the Federation of British Industries in the scrutiny of the War Damage Bill and when it became law was able to give useful guidance to members on the difficult and complicated question of valuation for insurance under the Act.

Council for the Coming Year

The constitution of the Council for the ensuing year will be as follows—

President: Mr. R. Duncalfe. *Vice-presidents*: Dr. E. F. Armstrong, F.R.S., Dr. F. H. Carr, C.B.E., F.I.C., Sir Christopher Clayton, C.B.E., Ph.D., F.I.C., Mr. E. V. Evans, O.B.E., F.I.C., Mr. C. A. Hill, B.Sc., F.I.C., Sir David Milne-Watson, Bt., D.L., LL.D., Mr. R. G. Perry, C.B.E., Mr. E. Wallace, C.B.E. *Honorary vice-presidents*: Sir Martin O. Forster, F.R.S., Mr. N. N. Holden, Lord McGowan, K.B.E. *Elected Members*: *Chairman*: Mr. C. F. Merriam. *Vice-chairman*: Dr. P. C. C Isherwood. *Hon. treasurer*: Mr. C. E. Carey. *Members*: Mr. F. W. Bain, M.C., Mr. T. R. G. Bennett, Mr. T. H. Board, Mr. G. E. Howard, Mr. H. Jephcott, Mr. W. F. Lutyens, Mr. L. P. O'Brien, Mr. J. H. Olliver, Mr. D. J. W. Orr, Mr. A. E. Peak, Mr. F. M. Roberts, Mr. K. H. Wilson, Mr. W. J. U. Woolcock. *Co-opted Members*: Mr. A. D. Daysh, Dr. A. E. Everest, Lord Trent.

Mr. C. F. Merriam, chairman of the A.B.C.M. for the coming year

Essential Work Order

Non-Compliance in the Chemical Industry

THE Executive Council of the Chemical Workers' Union recently issued to some 800 factory stewards and committees, a questionnaire on the Essential Work Order and its application. Information derived from about 600 of these which have been returned indicates that over half the firms granted "Provisional Registration," are not entitled to such registration in accordance with conditions outlined in Statutory Order 302 (General Provisions) because: (a) the firms are not engaged on essential work; (b) recognised wages and conditions under the Conditions of Employment and Arbitration Order are not being observed; and (c) satisfactory welfare provisions are neither in existence or contemplated.

The Restriction of Employment regulations, the Union states, are weighted against the workers: they are forced to work under illegal conditions or on non-essential work; are obstructed from offering their services where they would be of more value in the nations need for service; and are unreasonably prevented from securing higher wages and better conditions. It is claimed that if an employer wants to get rid of a worker whose only crime rests on his insistence that all legal regulations shall be carried out, it is an easy matter; but that if a worker applies to the National Service Officer for permission to leave, the claim is often turned down. Most workers' appeals against the Service Officer's decision are rejected. Workers who are offered employment in bigger concerns where they could render the national effort better services, for improved wages and under better conditions, are forced to stay where they are. The Union Executive is making a representation to the Minister of Labour, submitting a list of firms not in complying with the Essential Work Order regulations.

Numerous articles appear in the current *Oxy-Acetylene Tips*, issued by the LINDE AIR PRODUCTS CO., 30 East 42nd Street, New York, some of which are devoted to practical notes on welding. There is also the second part of "The ABC's of Metal Properties" which explains methods for measuring the hardness of metals.

Improved Electrostatic Separation

Development of the Rotating Electrode

THE principles of electrostatic separation have been familiar to chemical engineers for generations. Commercial development of the system was limited, however, on account of several varied considerations. The development of trustworthy sources of static charges was slow, in the first place, and the high voltages used required efficient insulation of the electrodes, not only to save power and maintain the high potential, but also to protect the workmen around the machines. Efficient separation demanded a uniform and uninterrupted static field, and this was difficult to accomplish before the days of air conditioning. Good results also depended on close and uniform sizing of the feed to the machine, and often the combined costs of screens and separator would render the process uneconomic. Uniform results could be obtained only with material which had been at least surface-dried, and this prohibited the use of the process in many cases where modern dryers now make it possible. Uniform feeding of the material was much harder to accomplish before the day of vibratory feeders. Another and quite distinct source of delay in development was the " trade secret " attitude, which has hampered chemical engineering progress in so many directions. Modern engineering knowledge has, however, helped to remove most of the real objections to this form of mechanical separation, and public-spirited research, both in this country and the United States, has gone far to remove the cloak of mystery.

Promising results are expected from a new dielectric electrode separator designed by H. Leslie Bullock (U.S.P. 2,225,096; December, 1940) and described by him in a recent paper (*Ind. Eng. Chem.*, 1941, *33*, 9, pp. 1119-1123). The new separator provides a completely insulated machine with a uniform field not subject to short circuit through the presence of metallic particles.

In the machines available in the past, the electrodes consisted of rods, tubes, or wires of conducting material, with or without an insulating covering. Most of the machines were constructed with bare electrodes, and where insulated electrodes were used, it was necessary to increase the voltage almost to the rupture point of the insulation if an electrostatic field of any effective strength was to be maintained. This construction called for the use of direct current voltages ranging from 14,000 to 35,000 volts. All

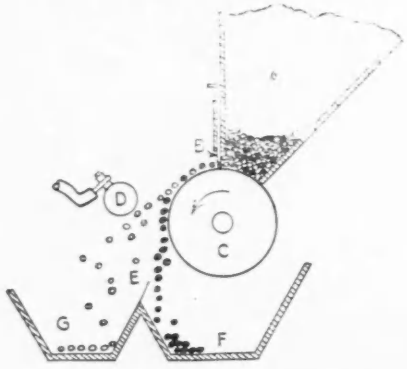


Fig. 1. Elementary separator, with standard stationary metallic electrode

the electrodes on a separator were joined together in a continuous circuit so that any local fluctuation was transmitted to all points of the separating areas. The large exposed areas of highly charged metal were subject to heavy losses of static charge during damp weather, machine operators were exposed to high voltages, and a single ground at any point of the machine rendered the entire separating field inoperative.

In the new construction, rotating electrodes made of a highly dielectric material are used. A surface charge of the desired polarity is generated on the surface of the non-conducting electrode, and the rotation of the electrode brings this surface charge into the field of action. The essential differences are clearly seen by comparing the conventional construction shown in Fig. 1 with the new construction shown in Fig. 2. The arrangement of the feed hopper, feed roll, divider, and collecting pans is essentially the same in both machines. The charged metallic conducting electrode D of Fig. 1 is replaced by the rotating non-conducting electrode J of Fig. 2. At the surface of the electrode J and at a point removed from the frame of the machine, there is a conductor, K, arranged so that when it is charged with a high-tension current of electricity, it will induce or set up a charge on the surface of J. Since J is made of non-conducting material, the charge is bound to the surface at the point of generation and is carried into position opposite the stream of material to be separated by the rotation of the roll. At that point it attracts particles carrying charges of opposite sign, some of which will ad-

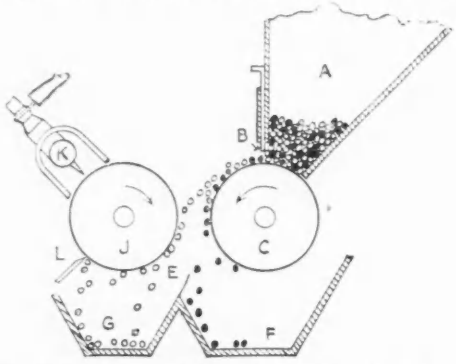


Fig. 2. Elementary separator with Bullock rotating dielectric electrode

here to J and be carried around to the point where they will be scraped off by scraper L. This construction allows the conductors carrying the high-tension current to be effectively insulated and removes them from the proximity of the frame of the machine. This avoids sparking and shorting out of the source of the attractive field, and affords much more effective protection for the workmen. Furthermore, since J is non-conducting, any piece of stray metal in the feed which might bridge the gap between the feed rolls and the electrode cannot produce a short circuit which will neutralise the entire field of the machine, but will only neutralise the point of J on which it rests.

The new construction presents another important improvement, in that the amount of charge on the surface of J can be regulated as well as its sign. In the old metallic electrode construction, since all electrodes were connected by conductors, the amount of charge on any electrode was limited only by the capacity of the source of power. Thus, in many separations, particles bearing an opposite charge would be drawn over to the collecting electrode where their charges would be neutralised and a charge of like sign induced on their surface. When this occurred, they were no longer attracted by the electrode but would be attracted to the nearest point of the grounded portion of the separator. If this nearest grounded portion happened to be on the other side of the divider, portions of the separated material would pass back into and contaminate the other ingredient of the mixture. With the dielectric construction, the amount of charge can be adjusted so that attraction takes place without complete neutralisation or recharging. Thus the separated material continues to stick to the roll and is carried round to a point where scraper L removes it and drops it into collecting pan G.

Chemical Matters in Parliament

Mustard Gas Decontamination

IN the House of Commons last week, Mr. Groves asked the Parliamentary Secretary to the Ministry of Supply whether he had yet received the report on the re-examination of a basic pharmaceutical ingredient, consisting of a dehydrated calcium hypochlorite admixed with a dehydrated sodium perborate, and whether the results of the examination showed that the product was an effective decontaminant for the eyes against mustard gas. Mr. Harold Macmillan replied in the negative.

Oils in Margarine

Mr. Thorne asked the Parliamentary Secretary to the Ministry of Food how many firms were now making margarine; how many tons were being made; whether he could state the calories in margarine and butter; and what kind of nuts and oils the manufacturers used.

In reply, Major Lloyd George revealed that the number of firms making margarine was 27. Output varied according to the ration requirements of the domestic consumers and the allocations made to trade users. The number of calories in one pound of butter or margarine was 3616, the calorific value being the same. Margarine was made from oils only, the oils generally used being ground nut oil, cotton seed oil, coconut oil, palm kernel oil, palm oil, and whale oil.

Potato Processing

In a further reply to a question by Dr. Little regarding the immediate erection of potato-processing factories to deal with this year's crop in Northern Ireland, Major Lloyd George said that a contract had been given for five factories and the necessary equipment was being manufactured. It was hoped to place orders for three or four additional factories in the near future.

Ordnance Chemist's Dismissal

Mr. G. Strauss asked the Parliamentary Secretary to the Ministry of Supply whether he would make immediate investigations in regard to Mr. J. Clark, a chemist at a Royal Ordnance Factory, who alleges he was dismissed because he exposed inefficiency in the administration of the factory; and Mr. A. Edwards also asked the Minister whether he was aware that Mr. Clark had been dismissed for urging, in a well-known periodical, greater efficiency in a Royal Ordnance Factory in which he was employed; and what steps he intended to take to avoid victimisation of this kind.

Mr. Harold Macmillan replied that this chemist was serving on probation, and his services were terminated before the period of probation expired, in view of reports by his superior officers indicating that he was not likely to prove suitable for retention in the particular factory at which he was working. These reports were made before the article referred to was published. He was informed that the National Service Officer, acting under the Essential Work Order, accorded his permission, and that Mr. Clark intended to appeal to the local appeal board.

Mr. Strauss further asked whether the Minister was aware that the allegations of inefficiency in this factory were supported in a written statement by 10 out of the 14 chemists working there, and that one of the charges against these chemists by the superintendent was that they were displaying misplaced sympathy with working people. In view of the important principles raised in this case, he hoped that the department would make a special inquiry into the facts?

Mr. Macmillan, remarking that he was dealing not with ten chemists but with one, said that the allegations made were that he was dismissed because of an article he wrote in a newspaper. He had pointed out, however, that his services were terminated before and not after the article.

A Strange Coincidence

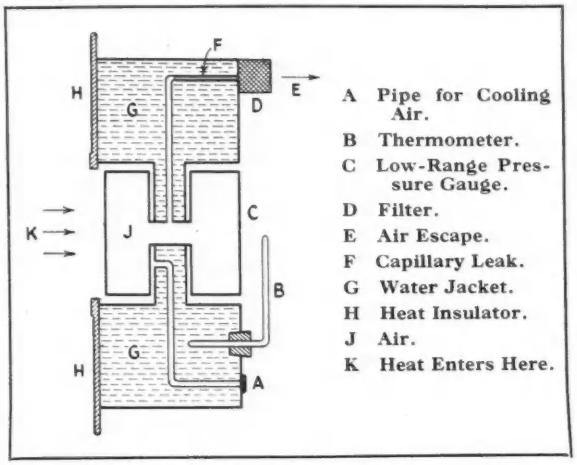
Mr. Edwards wished to know whether the Minister was certain that the dismissal was before publication; and whether he had personally seen the records on that point. His own information was that, by a strange coincidence, this chemist's inefficiency had been discovered only after he had criticised the inefficiency of his superior officers. On receiving the assurance of Mr. Macmillan that he would make further inquiry to ascertain whether the facts as given him were correct, Mr. Edwards stated that he would raise the matter on the adjournment.

(It is now announced that a full inquiry is to be held shortly into the allegations made by Mr. John Clark about the management of a munitions factory. The inquiry will take place at the factory. A large number of witnesses will be called).

Measurement of Heat-Flow

An Accurate and Rapid Instrument for Chemical Plant

HAVING read the paragraph in THE CHEMICAL AGE of September 27 (p. 164), entitled "Wanted: a Heat-Flow Meter," Messrs. Griffin and Tatlock, Ltd., through their Technical Manager, have called our attention to the Blackie Surface Heat-Flow Gauge, an instrument described in their catalogue No. 15B of Modern Chemical Apparatus.



From this it appears that there is an instrument already available fulfilling the need indicated in the above-mentioned paragraph.

The instrument claims to provide a direct, rapid, and accurate method for measuring heat losses from industrial plant, and indicates where additional thermal insulation can be advantageously applied. A water-jacketed air chamber, fitted with pressure gauge, capillary orifice, and thermometer, is placed close to, but not in contact with, the surface whose heat losses have to be measured, so that it receives heat by radiation and convection only. This is ensured by the ridge on the non-conducting plate, H.

The rate of rise of pressure or change of volume of the air in the chamber varies as the rate at which it receives heat. Rise of pressure causes air to leak out through the capillary orifice, F. This increases until at a particular pressure difference the rate of flow corresponds to the rate of heat input without further change of pressure. The pressure remains constant for a considerable time, and its amount is a function of the rate of heat flow. The time required to establish equilibrium is generally less than one minute.

The instrument is directly calibrated on a large hot-plate, electrically heated, whose heat losses per unit area can thus be accurately known. A rough check of the accuracy of the instrument can be obtained by removing the leather handle from the carrying case, filling the case with water and bringing to the boil by means of a Bunsen burner. The instrument is then applied to the surface of the carrying case and should give a definite reading, as shown in the graph and instructions supplied with the instrument. Radiation losses only can be measured by placing the instrument outside the stream of the convected air from the surface.

Gluten Meal in Paper Making

Prevention of Bleeding

by C. W. STEWART

IN the United States there are two commercial sources for corn proteins. These are corn gluten meal and zein. Gluten meal sells for about $25 per ton and zein, sold under the trade name of "Mazein," for about 20c. per pound. The production and properties of zein were fully treated on pp. 251-252 of THE CHEMICAL AGE for May 3. Gluten meal, however, is of nearly equal importance as a by-product in corn starch manufacture. It consists primarily of the gluten obtained during the starch tabling process and some portions of other by-products from the wet corn grinding and separating process. It contains about 42 per cent. protein, 30 per cent. starch, and 2.5 per cent. fibre; nearly all of it is used as a feed product.

Recent commercial tests have demonstrated that gluten meal, like zein, can also be added to the pulp in a paper beater in order to produce finished paper products with improved properties. The principal contributions of these corn proteins to paper are improved grease resistance, and resistance against the bleeding or running of asphalt or wax impregnated material when such impregnated paper is subjected to heat. But owing to its fibrous impurities and because the protein in the gluten meal does not have the bonding power equal, say, to that of the pure zein protein, gluten meal is unable to contribute to wet strength improvement. An example of its commercial use as a means for preventing the bleeding or running of asphalt or wax impregnated paper is afforded by the use of gluten meal in the manufacture of liner board. Liner board is a paper board, used as an inner or outer facing in the manufacture of corrugated or solid fibre board. It is made by combining several sheets of wet paper webs, the number varying from three upwards. Usually, the top and bottom sheets are of Kraft paper and the inner sheets are of waste newsprint or other waste paper material. By adding gluten meal to the beater containing the pulp intended for the top layer of the liner board, a finished liner board is obtained which is not subject to asphalt bleeding, when the liner board is used in the manufacture of corrugated paper. The gluten meal is added in the form of a caustic soda solution where 100 parts of a 1.6 per cent. caustic soda solution contain 20 parts of gluten meal. The latter is used in amounts ranging between 10 per cent. and 20 per cent. of the dry Kraft pulp. The gluten is then precipitated upon the Kraft fibre by the addition of alum until a *p*H of 6.4 is obtained in the beater.

A Low-Priced Material

During the corrugating process the liner board is subjected to heat and pressure, which combined are frequently sufficient to melt the asphalt or wax materials in the finished liner board and, therefore, to cause these materials to seep or bleed out into the outer surface of the liner board, thus producing an asphalt smear and a finished corrugated material of poor appearance. This is particularly objectionable in the case of food containers. The presence of gluten meal in the Kraft paper also tends to prevent the smearing of asphalt during the formation of the wet paper web from the beater containing waste paper pulp to which has been added the asphalt or wax material. The low price of gluten meal makes it an attractive material to use for bleed-retarding purposes for liner board, and where wet strength is not important, it could be extensively used to obtain various papers of improved grease resistance.

Among South African base minerals which are being produced in increasing quantities is barytes. In spite of the previous efforts made to develop the industry, production recorded a decline from 628 tons in 1937 to 541 tons in 1938 and 484 tons in 1939. Last year, however, the output soared to a record total of 844 tons, and during the first quarter of this year 349 tons of barytes were produced. All barytes mined in the Union is sold locally.

Liquid Rosin Imports

Scheme for Allocation of Supplies

SUPPLIES of liquid rosin for certain essential purposes are available to consumers in this country, under the Lend-Lease arrangements. In order that such supplies may be allocated in the best way possible, the Liquid Rosin Importers' Committee has issued a circular letter to consumers, and has requested THE CHEMICAL AGE to make reference to its terms in order that these may be noted by any consumer to whom it has not been sent.

Consumers are asked to submit to the Secretary, Liquid Rosin Importers' Committee, 39 Lombard Street, London, E.C.3, before October 20, the following particulars: (1) Average monthly quantity required for the six months, November 1, 1941—May 1, 1942, stating purposes for which required and quantity for each purpose; (2) total consumption for 12 months ended August 31, 1939; (3) names and addresses of their usual supplier or suppliers.

According to the instructions the committee has received from the Ministry of Supply, liquid rosin can be used for the following purposes only: (1) jointing compounds for aerodrome runways; (2) soluble cutting oils, including emulsifiers used in their preparation; (3) winter washes; (4) disinfectants. Should consumers require liquid rosin for any other purpose which in their opinion is essential to the war effort, they are recommended to apply to the Ministry of Supply for authority.

Chemical Exports from the U.S.

Upward Trend Maintained

EXPORTS of chemicals and allied products from the United States continued the upward trend evident last year, with shipments aggregating a value of $116,400,000 during the first five months of 1941, or 12 per cent. higher than in the corresponding period of 1940. Price increases were partly responsible for the improvement.

Large increases occurred in exports of phenol, coal-tar rubber-compounding agents, butanol, vitamins, copper sulphate, lead arsenate, synthetic gums and resins, calcium carbide, calcium chloride, zinc oxide, lithopone, titanium dioxide, ready-mixed paints, varnishes, phosphate rock, potassic fertiliser materials, and dentifrices.

Conspicuous among the items showing a decline during the same period were benzol, toluol, household insecticides and disinfectants, textile speciality compounds and other specialities, aluminium sulphate, sodium compounds (particularly sodium bichromate and sodium borate), carbon black, ammonium sulphate and other nitrogenous chemical fertilisers, crude sulphur, rosin, and turpentine.

The following table, published by *Foreign Commerce Weekly*, gives an idea of the movement of the various products.

Item	January-May 1940	January-May 1941
Coal-tar products	$13,145,900	$13,190,600
Medicinal and pharmaceuticals	12,109,300	15,993,100
Chemical specialities	16,632,600	17,030,300
Industrial chemicals	22,147,200	25,657,500
Pigments, paints and varnishes	10,803,700	10,334,600
Fertilisers and materials	6,041,000	6,440,300
Explosives	2,331,700	9,715,700
Soaps	1,324,500	1,351,700
Toilet preparations	2,616,200	2,390,200
Sulphur, crude	5,282,200	3,300,000
Sulphur, refined, crushed, etc.	320,800	661,700
Printing ink	611,400	738,100
Naval stores	6,494,500	4,652,900
Essential oils	1,549,100	2,585,400

A steelworks is being built at Vereeniging, South Africa, that will produce a million tons of steel a year—three times the Union's total pre-war output.

Preparation of New Glycosides

Direct Alcoholysis of Starch

by S. M. CANTOR

ALCOHOLYSIS of reducing sugars to produce the corresponding glycosides has long been known. Emil Fischer's work at the beginning of the century thoroughly covered the reaction of various reducing sugars such as dextrose, lævulose, xylose, etc., with alcohols. It has been found that reducing sugar polymers such as starch, dextrines, pentosans, etc., can be made to undergo a direct alcoholytic reaction between the individual reducing sugar unit of the polymer and the reacting alcohol. This reaction takes place with practically no liberation of any free reducing sugar.

In the standard Fischer reaction, such as, for example, the reaction between dextrose and acidified methyl alcohol for the production of methyl glucoside, a molecule of water is liberated. In the case of the reaction between an alcohol and a reducing sugar polymer, such as, for example, starch, the same methyl glucoside is obtained directly from the starch. There is, however, a difference between this starch reaction and the dextrose reaction of the Fischer method. In the case of the starch reaction, a direct alcoholysis takes place with no liberation of a molecule of water. It was found that under proper conditions the yields of methyl glucoside could be higher than that obtained by the old procedure of reacting pure dextrose with methyl alcohol. Semi-pilot plant runs at the Argo (Illinois) research laboratory of the Corn Products Refining Co. show that when dextrose is the starting material, the yield of methyl glucoside is about 76 per cent. of the theoretical. Starting with starch and using acidified methyl alcohol to which has been added about 5 per cent. of water, a methyl glucoside yield of 80 per cent. is obtained. The same starch alcoholysis, without the addition of the 5 per cent. of water, gives a methyl glucoside yield of about 65 per cent. It is obvious that since starch is a cheaper source of raw material for methyl glucoside than dextrose, and since the starch reaction can be made to give higher yields than the dextrose reaction, the alcoholysis of starch for the production of pure methyl glucoside offers many commercial advantages. All the yield figures are based on α-methyl glucoside. If β-methyl glucoside is desired, one may proceed to obtain it from an α-methyl glucoside mother liquor by means of the usual Fischer treatment with anhydrous soda ash.

Intermediate Dextrose Polymers

Good results have been obtained with starch alcoholysis by using methyl, ethyl, -propyl, -butyl or amyl alcohols. With the exception of methyl glucoside, all these starch alcoholysis products are non-crystallisable syrups. These syrups are not glucosides, but are mixtures of non-crystallisable glycosides. They contain the dextrose glucoside of the corresponding alcohol, together with a mixture of glycosides resulting from the alcoholysis of the alcohol with intermediate dextrose polymers which are produced during the alcoholysis of the starch by the acidified alcohol. These intermediate dextrose polymers may vary all the way from disaccharides, such as maltose, to trisaccharides, and still higher polysaccharides intermediate between the trisaccharides and starch polymer itself. It is the presence of the glycosides of these intermediate dextrose polymers that differentiates these glycoside syrups from the non-crystallisable products obtained by Fischer when he reacted dextrose with ethyl alcohol or higher alkyl alcohols.

Fundamentally, the reaction between starch and alkyl alcohol is carried out under conditions practically identical with those of the Fischer reactions. For example, to produce methyl glucoside from starch under anhydrous conditions, 100 parts of moisture-free starch may be treated with 1500 parts of methanol to which has been added 60 parts of dry hydrogen chloride gas, after which the mixture is refluxed for 24 hours. After filtering, cooling to room temperature, crystallising, centrifuging, reconverting the greens with acidified methanol and recrystallising, one obtains, with proper re-use of all liquors, a net yield of 65 per cent. of crystalline methyl glucoside.

An ethyl glycoside syrup is obtained by treating 10 parts of commercial corn dextrine with 500 parts of 95 per cent. ethyl alcohol, to which has been added 33 parts of 18°Bé. hydrochloric acid, and converting in a steam-jacketed pressure cooker for 3 hours at 40 lb. pressure. The product is then neutralised with anhydrous sodium carbonate, filtered, decolorised and vacuum-evaporated to remove the excess of ethyl alcohol. This gives an ethyl glycoside syrup containing only a small amount (about 1 per cent. to 2 per cent.) of reducing material, indicating a very efficient alcoholysis of the dextrine. The finished product is a dark brown syrup. Similar reactions with higher alkyl alcohols produce corresponding glycoside syrups. Instead of using starch as the high reducing sugar polymer, various types of intermediate starch breakdown products, available in a glucose or corn-sugar refinery, may be utilised. For example, one may spray-dry ordinary commercial glucose and subject the dry powder to alcoholysis, or one may remove the moisture from corn-sugar hydrol by means of toluene distillation or otherwise, and then subject the dried hydrol to alcoholysis. The resulting products will be glycoside syrups which in general have the same properties as those obtained from starch. Chemically they are different from the starch glycoside syrups in that the proportion of the various intermediate dextrose polymers is different from that obtained by using starch.

Properties of Glycoside Syrups

These glycoside syrups have been found to have interesting surface acting properties. They also may act as plasticisers and are capable of being blended with certain industrial organic solvents, particularly the alcohols enumerated above. The same type of reaction is possible with other polymers of either reducing sugars or reducing sugar acids, namely glucuronic acids. Thus, polymer materials such as pentosans, pectin, cellulose and gum arabic are capable of similar alcoholytic reactions.

In the case of monohydric alkyl alcohols, only the alkyl alcohols up to five carbon atoms are capable of this reaction with starch or other high reducing polymers. Other alcohols within this carbon range, such as the dihydric alcohols (ethylene glycol, propylene glycol) or the trihydric group, such as glycerine, should be capable of the same reaction. The same reaction would appear likely to take place with any alkyl ROH compound up to and including the five-carbon atom range, *e.g.*, alkyl hydroxy acids such as lactic, tartaric, or citric acids. In the case of lactic acid, which is a liquid, one should be able to carry out the reaction by suspending starch or some other reducing polymer in the liquid lactic acid, converting it in the presence of a small amount of mineral acid catalyst. The other two acids, which are not liquid, would necessitate the use of some sort of liquid medium inert towards starch or dextrose and at the same time a solvent for these acids. Experiments on these various aspects of the high reducing polymer-alcoholysis reaction are planned for the near future.

If the necessary approval is forthcoming from R.C.A.F. officials a plant is to be prepared in Canada to go ahead with mass production of "plastic" Anson fuselages. These fuselages are not plastic in the generally understood sense of the word, since they are not moulded from a composition, but are made of laminated woods held together by a phenol-formaldehyde resin substance and assembled under high air pressure by the system perfected by E. L. Vidal.

Personal Notes

After the luncheon of the Institute of Fuel, held in London on Wednesday, MR. W. M. SELVEY was installed as president by the outgoing president, LT.-COLONEL SIR JOHN GREENLY, and the Melchett Medal for 1941 was presented to DR. CLARENCE A. SEYLER.

MISS JOAN DAVENA PEDEN, B.Sc., has been appointed temporary assistant analyst in the Liverpool City Analyst's Department, for a period of 12 months. She is the daughter of Mr. David Peden, Laboratory Assistant, Liverpool City Bacteriological Department.

MR. D. N. TURNER, MR. H. H. BERRESFORD, and MR. T. A. MCKENNA were each recently presented with a memento from the commercial staff of the Staveley Coal and Iron Co., Ltd., on their being appointed respectively chairman, managing director, and commercial manager of the company. MR. A. BRADBURY, chemicals sales manager, was the chairman of the meeting convened for the presentations, which were made by MR. J. BRYANT, foundry sales manager.

Obituary

MR. OSWALD B. LEIGH, who died this week at Broughton, Scunthorpe, Lincs., aged 64, was a pioneer of the iron and steel industry at Scunthorpe, and had for many years, until his recent retirement, been associated with the North Lincolnshire Iron Co., Scunthorpe's first steel-smelting concern.

MR. JOHN C. BICKFORD-SMITH, B.A., who died at Helston, Cornwall, on October 3, was chairman of the board of directors of Bickford-Smith & Co., Ltd., safety-fuse manufacturers, Camborne, until the time of the firm's amalgamation with I.C.I., when he retained his connection with the company as a local director—a position which he held to the time of his death. He was a member of a well known Cornish family.

THE RT. HON. LORD ARMSTRONG, M.A., Hon. D.C.L., died at his residence, Cragside, Rothbury, Northumberland, on October 15, aged 78. He was grand-nephew of the founder of the famous Tyneside shipbuilding firm that bears his name, and he was chairman of the Thermal Syndicate, Ltd., Wallsend. He had devoted his life to furthering the interests of welfare work in his native county of Northumberland.

New Control Orders

Export of Metal Capsules

THE Board of Trade has made an Order, the Export of Goods (Control) (No. 35) Order, 1941 (S.R. & O. 1941, No. 1561), prohibiting, except under licence, the export of metal capsules.

Coal Supply

The Board of Trade has made the Coal Supply Order, 1941 (S.R. & O. 1941, No. 1497), which consolidates and extends the powers under the Coal Supply Order, 1940, and the Coal (Treatment and Use) Order, 1940, and which empowers the Secretary for Mines to give directions to colliery owners, coal merchants, and various classes of industrial consumers as to the disposal, treatment, use, acquisition and storage of coal (which includes cannel coal, anthracite, coke and any manufactured fuel of which coal, anthracite or coke is the principal constituent).

Aqueous Dispersions of Rubber

The Treasury has issued the Import Duties (Exemptions) (No. 3) Order, 1941 (S.R. & O. 1941, No. 1523) which exempts from the general *ad valorem* duty, for the period ending May 29, 1942, certain aqueous dispersions of rubber used in the hermetic sealing of cans.

Nutrition Society

Initial Meeting at Cambridge

EMINENT food chemists are meeting at Cambridge to-day, Saturday, October 18, to discuss the foundation of a Nutrition Society, the project for which was mooted just before the war. The meeting will engage in a conference on "The Evaluation of Nutritional Status," and contributions have been promised by Sir F. Gowland Hopkins, Dr. Leslie Harris, Dr. B. S. Platt, and Dr. C. Crowther. Other well-known authorities have undertaken to take part in the discussion. It is proposed to establish a society on the lines of the Biochemical Society, though the question of publishing a journal is for the moment shelved. It is thought that it might be convenient to form separate English and Scottish branches, in view of transport difficulties. Further particulars of the Society can be obtained from the Hon. Secretary, Dunn Nutritional Laboratory, Field Laboratories, Milton Road, Cambridge.

Dutch Claim on Aniline Stock

Possible Control of I.G. Subsidiary

THE Netherlands Government may be in a position to claim control of the General Aniline and Film Corporation, the principal American subsidiary of I.G. Farbenindustrie, as the result of a lawsuit which has started before the Delaware Chancery Court, states a report in the *Herald Tribune*, quoted by Reuter. The basis of the Dutch claim, it is stated, is that 1,550,000 shares in General Aniline stock, being the majority of outstanding shares, are recorded on the books of the corporation in the names of two Dutch concerns, namely, "Chemo"-Mij. voor Chemische Ondernemingen N.V. and N.V. Mij. voor Industrie en Handelsbelangen.

A Swiss holding company, known as I.G. Chemie, claims to own more than 90 per cent. of Aniline stock, which, it states, it bought from the Dutch firms a few weeks after war started and before the invasion of Holland. The books of General Aniline, however, do not record the change.

The Dutch Government's claim is based on a Netherlands Decree of May 24, 1940, but whether it will be sustained depends on the outcome of involved legal proceedings expected to last several months and on whether the Netherlands Government decides to press the claim. The hearing has been adjourned for 60 days.

Conversion of Straw into Fodder

Minister Defends I.C.I.

THE Minister of Agriculture, Mr. R. S. Hudson, last week attended a demonstration of a process developed by Imperial Chemical Industries to break down fibre in wheat straw and make it digestible by live stock, as described in THE CHEMICAL AGE on April 26. The process includes soaking chopped wheat straw in a weak solution of caustic soda. For 15s., a ton of straw can be transformed into 3½ tons of pulp equal in food value to 4¼ tons of root and 10½ cwt. of crushed oats or beet pulp. In eight weeks 400 plants have been installed.

Two months ago, said Mr. Hudson, he asked I.C.I. to conduct a national campaign for adoption of the process. It had been said that this was just an I.C.I. ramp. His answer was that any commercial advantage to that firm was trivial compared with what they had spent in developing the process for the national benefit. Another criticism was that he ought not to have advocated the process until more experimental evidence was available. It would be a bad outlook for the progress of research if we always had to wait before adopting some sound new method until exhaustive experiments had been conducted over a long period of years. Thirdly, it was suggested that the new process was not really necessary because there was no shortage of feeding-stuffs. Nothing could be farther from the truth, and Mr. Hudson urged all who had facilities to instal plants at once.

Synthetic Chemicals in Fuels and Lubricants

An Expanding Phase of Chemical Industry

INCREASING significance attaches to the petroleum industry as a producer of raw materials for chemical synthesis. Thus the manufacture of alcohol and other solvents from the cracked gases of refinery operations is well established, and petroleum offers a cheap source of carbon and hydrogen for many other syntheses. An increasing volume of the synthetics used in products of the petroleum industry is being made in the refinery itself, and a paper by W. G. Whitman before the National Industrial Chemical Conference, Chicago (*Ind. Eng. Chem.*, 1941, *33*, 865), reviews typical examples of this development. Whether used in very small percentages as addition agents or in considerable proportions as blending agents, synthetic materials are relatively expensive, compared with natural materials, and the commercial justification for their use depends on the improvement in quality effected.

A notably successful example of the use of addition agents is tetraethyl lead, which is applied to so large a volume of petrol for anti-knock improvement that the expenditure involved is believed to exceed the sales of any other single organic synthetic material, although the concentration does not exceed about 0.1 per cent. and averages about 0.02 per cent. Similarly, organic anti-oxidants are used in concentrations measured in thousandths per cent., but the total consumption can be reckoned in tons per day. Addition agents such as amyl nitrate and organic polysulphides raise the cetene number of diesel fuels, and increasing use is likely to be made of this method of improving their ignition qualities. Other examples of addition agents are disalicylalethylene diamine to prevent the catalytic oxidising effect of copper on petrol; alkyl naphthalenes as pour-test depressors in lubricating oils; and extreme-pressure agents containing sulphur, chlorine, or oxygen in the molecule.

The demand for high-octane aviation petrol has created a problem which refiners meet by the manufacture of synthetic fuel. Thus, 100-octane petrol may contain about 50 per cent. of such synthetic fuel. Raw materials for the synthesis of high-octane hydrocarbons are found largely in the C_4 cut containing the mixture of butanes and butylenes which can then be treated by the cold acid, hot acid, phosphoric acid, or catalytic alkylation process, as the case may be. Synthetic products are expensive compared with natural fuels and lubricants from petroleum, but refiners' synthetics are relatively cheap compared with synthetic chemicals as a whole, and the rapidity with which synthetic fuel production is developing is indicated by the fact that its annual volume already compares with the production of the coal-tar industry.

Fish Oil for New Zealand

Imports Affected by War Conditions

From a Correspondent in Auckland.

SINCE the invasion of Norway and recent prohibition of exports from the United Kingdom there has been an appreciably large market in New Zealand for cod liver oil for any country that can supply it. Stocks that were purchased some time ago being now pretty well exhausted, the supplies available to the trade consist of small shipments from Newfoundland and Australia. So importers seek additional sources.

By virtue of its vitamin content the oil is much in demand by New Zealand manufacturers of health tonics, and there is perhaps a better *per capita* sale in the Dominion than in most countries for the preparations of this oil, as well as for the unadulterated product. Several well-known emulsions, etc., are prepared locally by branch factories of parent concerns, which purchase direct and are able to contract for shipments in bulk. Other direct buyers are wholesale druggists, who distribute the oil in small bottles and in gallon tins, and chain-store druggists. Business is also done through agents and indent houses, who provide useful service in attending to the needs of small manufacturers and wholesalers, and occasionally of larger organisations. The recommended procedure is to sell direct to the large dealers and employ an agent to look after the small ones. The standard of quality required by the health authorities is that specified by the British or the United States Pharmacopœia.

Bulk shipments are packed in 25-gallon tin-lined drums. On occasion iron drums holding 45 to 50 gallons are used, but are not particularly favoured. Packaged oil comes in 1-gallon tins and, usually, is sold under a local or overseas label. Owing to the spasmodic nature of shipments under present conditions prices are not exactly firm, and have risen steadily since the war. July quotations for Newfoundland oil were 22s. per gallon c.i.f. New Zealand ports, or about 23s. landed. British (refined from Norwegian) and Norwegian oils were quoted before the war at 5s. to 7s. per gallon c.i.f. By the middle of 1940 the price from the United Kingdom was 15s., increasing later in the year to over 20s. Owing to the prohibition of exports no quotations are now available.

Cod liver oil from Empire countries enters New Zealand duty free. But, as with most other items of duty, a primage duty of 3 per cent., based on eleven-tenths of the current domestic value in the exporting country, must be paid. Under the New Zealand exchange and import control regulations no restriction is placed upon medicinal fish oils, *i.e.*, they may be imported from individual countries to the value of imports in 1938.

Halibut Oil Conditions

The demand for halibut liver oil is limited by its high price. At the moment none is offered from the United Kingdom or the United States, the usual sources of supply. The latest quotation, nearly a year ago, was 150s. per gallon. The trade in this oil consists of small parcels of capsules and one-gallon tins, for sale in small bottles. Practically all of it is brought in by one or two prominent chain-store druggists. No separate import statistics are available, but the Customs Department estimates, from shipping documents, that imports in 1940 came almost wholly from the United Kingdom.

Precipitation of Basic Lead Acetate

Effects of Bismuth in Litharge

DIFFERENT brands of litharge behave differently when going into solution in dilute acetic acid for the production of lead acetate and basic lead acetate. These variations are generally attributed to the impurities present in most commercial lead oxides and to the crystal structure of the oxides, tetragonal and orthorhombic. An empirical test commonly employed by makers of lead chromate pigments and lead naphthenate driers consists in adding 122 g. of the litharge sample to 25 ml. of glacial acetic acid diluted to 500 ml., the temperature being maintained at 50° C. Satisfactory litharge goes into solution and precipitates a voluminous mass of microscopic needles of basic lead acetate, but unsatisfactory litharge forms only small amounts of precipitate owing to the presence of sulphates, carbonates, silicates, etc., as impurities. Tests reported by D. H. Haskell (*Ind. Eng. Chem.*, 1941, *33*, 873) demonstrate the effect of small amounts of bismuth as inhibitor. The addition of measured amounts of bismuth trioxide to the acetic acid solution prior to the addition of litharge shows that the larger the amount of bismuth, the greater the concentration of basic lead acetate before precipitation occurs. Results from litharge artificially contaminated by from 0.01 to 0.1 per cent. of bismuth agree well with tests on normal litharges analysed for bismuth, and show quantitatively how the naturally occurring bismuth content of commercial lead affects the precipitation of basic lead acetate as practised in colour-making plants. There appear to be unexplained anomalies above 0.25 per cent. bismuth content, but within the usual range of commercial litharges the author's findings offer a basis for practical appraisal of these materials by pigment manufacturers.

General News

Dr. G. S. Whitby gave an address entitled "Nylon and its Significance for the Plastic Industry" at a meeting of the Institute of the Plastics Industry held on October 16 at Oddenino's Hotel, Regent Street, W.1.

The question of the amount of calcium to be added to food, in view of its deficiency in the present national diet, is still under consideration by the Ministry of Food, according to a reply given by Major Lloyd George to Professor Hill in the House of Commons last week.

The action of I.C.I. (Alkali), Ltd., in demoting two steamer captains, who, with their crews, left their ships unattended all night, has been confirmed by the Industrial Court. The firm carries on business at Northwich, Cheshire, and goods are shipped thence by steamer and barge to Liverpool and Birkenhead.

Among further changes in the Schedule of Reserved Occupations announced by the Ministry of Labour on October 10, various classes of workers in artificial manure and fertiliser manufacture are now reserved at 25 and 30, in view of the large increase over pre-war production of these materials now needed. The age of reservation for glass-blowers is reduced to 18.

A serious increase in factory accidents in 1940 is reported by the Chief Inspector of Factories. There were 1372 fatal and 230,607 non-fatal accidents during the year, increases of 24 per cent. and 20 per cent. respectively over those of 1939. The main cause was the increase in the number employed on war effort; but the Inspector complains of a tendency to take less care than usual.

The Experimental Researches and Reports published by the Department of Glass Technology, Sheffield University, have now reached their 23rd issue. This interesting 250-page volume (7s. 6d.) contains papers collected from *J. Soc. Glass Technology* and *Glass Review*. Professor Turner, Dr. A. J. Holland and Dr. Eric Preston are the principal contributors.

The Minister of Labour, by the Essential Work (Iron and Steel Industry) (No. 2) Order, 1941 (S.R. & O. 1941, No. 1556), dated September 30, has added to the schedule of agreements at the end of the original Iron and Steel Industry Order a further list of agreements for the purpose of ascertaining agreed wages in the industry. The list comprises nine agreements made between employers' and workers' associations dating from July 14 to September 4 this year.

The Melchett Lecture, which was to have been delivered at last Thursday's meeting of the Institute of Fuel by the Melchett Medallist, Dr. Clarence A. Seyler, D.Sc., F.I.C., was not after all presented. The work on which Dr. Seyler had been engaged, and which was the subject of the lecture, under the title "Recent Progress in Coal Petrology," was of such outstanding importance and had received so much consideration by the D.S.I.R., that the Department had reluctantly decided it could not at present be delivered or published. Although this was a great disappointment, both to Dr. Seyler and to the Institute, the very fact was a compliment to the author and his work.

Foreign News

The production of tantalum-titanium carbides by the Carboloy Co. of Detroit for the machining of tools is reported to have been 495 per cent. higher during the first quarter of 1941 than in the corresponding period of the previous year.

A plant for the manufacture of synthetic phenol is to be constructed by the Solvay Process Co. at Syracuse, N.Y. It is reported that a process developed by Solvay engineers will be used.

Diamond drilling operations at the barytes deposit which was discovered in October, 1940, near Walton, Nova Scotia, have revealed reserves amounting to about 1,500,000 tons. A grinding plant with a capacity of 100 tons a day was completed last June.

From Week to Week

The export duty on wolfram from Portugal, it is reported, has been raised from 1 escudo 80 centavos to 2 escudos 80 centavos.

The use of chrome compounds except for the manufacture of goods ordered by the central Government is controlled under an order issued by the Government of India on October 9.

The chemical works at Mazingarbe, near Béthune, Northern France, were again attacked by Bomber Command on Monday afternoon (*see* THE CHEMICAL AGE, September 27, p. 177). Hits were observed on the cooling tower of the plant.

New rich manganese deposits have been discovered in the Bashkir Republic and at the southern end of the Urals, according to Moscow radio, says Reuter. The discovery will make the importation of manganese ore for Soviet steel production unnecessary.

More soda ash and caustic soda were imported into Brazil from Great Britain in 1940 than in 1939, in spite of the war. Brazil's imports of soda ash from Britain increased from 11,577 metric tons in 1939 to 15,922 in 1940; imports of caustic soda rose from 15,019 to 17,977 tons.

The United States War Department has awarded to the Commercial Solvents Corporation of New York the contract for the construction of a plant to produce anhydrous ammonia. The plant, which will cost $9,250,000, will be situated at Sterlington, Louisiana. The Army has contracted to take the entire first year's ammonia output.

Production of phosphate rock at Nauru and Ocean Islands during the twelve months ended June 30, 1940, is said to have totalled some 1,237,000 tons, or about 2 per cent. more than in 1938-39. Australia is reported as having taken about 667,000 tons, New Zealand 404,000 tons, U.K. 40,000 tons, and other countries 126,000 tons.

By-product sulphuric acid from United States copper and zinc plants, in terms of 60° Bé. acid, amounted to 840,937 short tons in 1940, of which 254,025 tons were produced at copper plants and 586,912 tons at zinc plants, according to the Bureau of Mines. This compares with the 1939 output of 778,441 tons.

Experiments with certain chemicals were begun in Sweden during 1940 by Höganäs-Billesholms A/B, a coal-mining concern. Certain types of tar oils were successfully extracted from its gas generating plant and production of these oils, suitable for motor operation, will shortly amount to between 2000 and 3000 tons annually.

According to an official statement published in Chile it is expected that during the present nitrate year ending June 30, 1942, sales of Chilean nitrate of soda will amount to 1,300,000 metric tons, compared with 1,450,000 tons last year. This is considered satisfactory in view of the fact that many markets are closed, and it is understood that arrangements have been made to use requisitioned Danish ships to ease the freight situation.

The development of refined chemical products from coal is receiving increased attention from the Koppers Co., Pittsburgh, Pennsylvania. Research activities have been much expanded, both at the Mellon Institute and in the company's own laboratories. Scientists of international reputation have been added to an enlarged research staff, numbering about 100 this year, thus making a logical step in the development of a concern long engaged in the large-scale production of coke, tar, light oils, and derived crude chemicals.

At the meeting of Soviet scientists held in Moscow last Sunday, Professor Frumkin, chief of the chemistry department in the Soviet Academy of Science, said that the only progress made by the Nazis in the domain of chemistry had been in the field of narcotics and stimulants for the armies of the Reich. Professor Komarov, President of the Academy of Science, spoke of the obstacles facing men of science in Germany, and Professor Kapitsa, the famous physicist, also referred to the strangling hand of fascism upon science.

Production of zinc in the United States during June totalled 62,916 tons of recoverable zinc as compared with 60,703 tons in May. The production for the first six months of 1941 was 359,360 tons. Preliminary estimates for July indicated that production would approximate 62,200 tons, a slight decline from the June output.

Carnauba wax, which is used in the manufacture of oils, soaps, polish, etc., now ranks in value as one of Brazil's most important export products. The quantity produced each year is from 10,000 to 12,000 metric tons, and during the first six months of 1941 exports reached 7152 tons compared with 5368 tons in the first half of 1940. The value of these exports were recorded at 163,655 contos (approximately £2,000,000).

The Danish Sulphuric Acid & Superphosphate Co. is reported to have begun the production of crude carbolic acid in connection with tar distillation to replace former imports and to have developed a new tar emulsion for road work. Other news of the company is of the manufacture and marketing of ensilage acid, for which there is an increasing demand. It is understood that the solution is either sulphuryl chloride or a mixture of hydrochloric and sulphuric acids.

Celestine, native strontium sulphate ($SrSO_4$), also called celestite, has been rediscovered in the Trichinopoly district of S. India in large quantities. A record of its existence made some years ago by Dr. H. Warth, then superintendent of the Government Museum, Madras, appears to have been forgotten. As India imports several tons of celestine per annum, for flares, pyrotechnics, medicinal purposes, etc., the find is of some importance.

Acetone, acetaldehyde, and other ketones and aldehydes can be synthesised from acetylene by a new steam process patented by Ipatieff and Raymond of Chicago and assigned to the Universal Oil Products Company of the same city. Among the main factors in the synthesis is the use of a phosphoric acid catalyst. The acid is absorbed in kieselguhr and the mass baked to form bricks of a silico-phosphoric acid complex. The acetylene and steam are reacted in the presence of these bricks at a temperature of 275° C. Reaction takes place with formation of the above-mentioned products.

Recent official figures showed a production of iron pyrites in Spain of 104,722 tons during the first four months of 1941, but no figures are available on production of copper pyrites. Imports of Spanish pyrites into the United States during the first five months of 1941 amounted to 26,500 tons, representing 30 per cent. of the total imports of pyrites during the period. Spain supplied 325,000 tons, or 80 per cent. of the pyrites imported in 1940, and 282,700 tons, representing 59 per cent. of the total imported in 1939. Substantial purchases of copper and iron pyrites from the Spanish- and French-owned mines have been made for shipment to Germany.

The shortage in India of imported synthetic dyes has had two interesting results: the stimulation of the domestic coal-tar dye trade, and the revival of the production of vegetable dyes. The Government Textiles Institute, Madras, has worked out successful methods of dyeing with several natural dye-yielding products of indigenous growth. These were in vogue before the advent of synthetic dyes, but unfortunately the processes were all forgotten. Meanwhile, the proposed installation of a big plant for the recovery of coal-tar by-products at Tatanagar is expected to lead to the production of innumerable organic compounds and drugs and may turn out to be the forerunner of a synthetic dyestuffs and drugs industry.

Forthcoming Events

The East London Branch of the **Association of Scientific Workers** will hold a meeting on **October 19,** at the West Ham Municipal College, commencing at 2.30 p.m., when Dr. Fudge, of the Science Department of the College, is to give a talk on the training of the chemical assistant. All scientific workers are invited to attend.

The Electrodepositors' Technical Society will hold a meeting on **October 20,** at 4 p.m., in the Northampton Polytechnic, St. John Street, E.C.1, when Mr. A. E. Richards, B.Sc., will present a paper entitled "The Jointing of Metals with particular reference to Silver Solders and Brazing Alloys."

Members of the **Fuel Luncheon Club** will meet in the Connaught Rooms, Great Queen Street, Kingsway, W.C.2, on **October 22,** at 12.40 for 1.10 p.m., when Lieut.-Col. W. A. Bristow, M.I.E.E., will install Sir David Milne-Watson, Bart., LL.D., as President of the Club for the coming year. After the installation, Sir David Milne-Watson will give his presidential address entitled, "Fuel and the Future."

The fourth Hinchley Memorial Lecture is to be delivered before the **Institution of Chemical Engineers** by Sir Richard A. Gregory, Bart., D.Sc., LL.D., F.Inst.P., F.R.S., on "Scientific Knowledge and Action." The lecture will be delivered in the Reading Room of the Institution of Civil Engineers, Great George Street, London, S.W.1, on **October 24,** at 2.30 p.m., the President, Mr. C. S. Garland, presiding. Non-members will be welcome and tickets may be obtained for them on application to the assistant secretary.

The fourth symposium in the "Nation's Food Series" arranged by the Nutrition Panel for the Food Group of the **Society of Chemical Industry** has for its subject "Cereals as Food," and will take place at Burlington House, on **October 29** in morning and afternoon sessions. Papers will be presented by R. G. Booth, R. H. Carter, C. R. Jones, and T. Moran; A. L. Bacharach and Dr. D. W. Kent Jones; H. C. Moir; and W. P. Ford. The chair will be taken by Professor J. C. Drummond.

British Chemical Prices

Market Reports

THERE have been no outstanding movements in the market for general chemicals, firmness in quotations being a general feature. In most sections of the market the supplies for an immediate delivery are very scarce, and in consequence new business is restricted. On the other hand, ex contract deliveries to the chief consuming industries continue along steady lines and specifications cover good volumes. In the potash and soda sections quotations remain very firm, with the scarcity of offers continuing for some items, and there is a sustained demand for solvents and heavy acids. Strong price conditions are again reported for the majority of the coal tar products, and with the exception of pitch and pyridine, the demand remains active throughout. The movement of both crystals and crude grades of carbolic acid are reported to be good, whilst cresylic acid and crude naphthalene supplies remain on the short side.

MANCHESTER.—Activity has been well maintained in most sections of the Manchester chemical market during the past week from the point of view of contract requirements, and a moderate weight of new business has been reported. Rubber chemicals have met with a steady demand, and a wide range of textile chemicals has been called for in fair quantities by the bleaching, dyeing, and finishing trades. Values generally are on a very firm basis, and the tendency in some sections is towards higher levels. In the by-products market, while deliveries of such materials as crude tar, creosote oil, carbolic acid, and most of the light distillates keep up a good level, actual new bookings, on the whole, are said to have been less in evidence.

GLASGOW.—In the Scottish heavy chemical trade, the home market remains very steady. Export business is quiet on account of restrictions on various materials. Prices keep firm.

Price Changes

Cadmium Sulphide.—5s. 9d. to 6s. 3d. per lb.
Carbon Black.—5¼d. to 8d. per lb., according to packing.
Citric Acid.—1s. 5½d. per lb. MANCHESTER: 1s. 6d.
India Rubber Substitutes.—White, 5 15/16d. to 9d per lb.; dark, 5 9/16d. to 6 3/16d. per lb.
Vegetable Lamp Black.—£48 10s. per ton.

British Emulsifiers, Ltd., of Hanworth, Middlesex, summoned recently by Feltham Food Control Committee for failing to deliver to them a form required under the Rationing Order, and, further, for failing to furnish particulars relating to their dealings in, and stocks of, rationed foods, were fined £2 by the local Bench. The defendants were licensed as a catering establishment, for which monthly returns had to be sent in. For the defence it was stated that the firm's canteen manageress might have been slack about returning the forms, but the firm did all they could to put matters right. The Food Committee could have co-operated a little more.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BRITISH VARNISH AND COLOURS, LTD., Stockport. (M.,18/10/41.) September 23, £400 debenture to J. Bosson, Sandbach; general charge. *—. November 16, 1938.

Satisfaction

PLASTER PRODUCTS (GREENHITHE), LTD. (M.S., 18/10/41.) Satisfaction, September 26, £15,000 (not ex.), registered June 3, 1938.

Company News

Palestine Potash, Ltd., have declared a gross profit for 1940 of £291,999, less tax.

Wm. Wren and Co. (Watford), Ltd., polish manufacturers, etc., changed their title to Wm. Wren, Ltd., on September 22.

Welsh Agricultural and Chemical Industries, Ltd., 95 Gresham Street, E.C.2, changed their title to Avonmouth Farms, Ltd., on September 25.

Chemi-Synthetics, Ltd., 1 Broad Street Place, E.C.2, have increased their nominal capital beyond the registered capital of £1000 by the addition of £9000 in £1 ordinary shares.

Low Temperature Carbonisation, Ltd., announce a record trading profit, for the year ended March 31, of £121,878 (£69,608), less tax.

Bryant and May, Ltd. (controlled by **The British Match Corporation**), announce that after paying an interim dividend of 10 per cent., free of tax for some years. There is a reduction to 8½ per cent., tax free, on account of the year ended March 31.

English Clays Lovering Pochin and Co., Ltd., have declared dividends of 5½ per cent. on the first cumulative preference shares and 7 per cent. on the second cumulative preference shares, for the half-year ended September 30.

Lovering China Clays, Ltd., have declared a balance of debenture interest of 1½ per cent. for the half-year ended September 30, plus interest at 6 per cent. per annum under the moratorium scheme.

British Celanese, Ltd., announce that the dividend payment on the 7½ per cent. second preference shares is again being deferred, as discussions which have been taking place with the Revenue authorities regarding E.P.T. standard and income tax liability have not yet been concluded.

The Steel Barrel, Scammells, and Associated Engineers, Ltd., report a net income, for the year ended June 30, of £28,906 (last year, £26,822). A final ordinary dividend of 9 per cent. is recommended, making 15 per cent. for the year (12½ per cent.). The carry forward is £8835 (£5314).

Owing to increased taxation the net profit announced by **The Electrolytic Zinc Co. of Australia, Ltd.**, is £363,784, as compared with £448,782 for the previous year. As already reported, both the ordinary and preference shares receive a final dividend of 8 per cent., making 14 per cent. for the year (same).

New Companies Registered

Chemring, Ltd. (369,716).—Private company. Capital: £6000 in 6000 shares of £1 each. Manufacturers of and dealers in chemical products and preparations, compounds, cements, oils, paints, pigments, varnishes, dyeware, scientific apparatus and machinery, etc. Subscribers: Ladislav Ploskal; Albert H. Jarrard. Solicitors: R. A. Rotherham & Co., 8 The Quadrant, Coventry.

Metal and Electro Chemicals, Ltd. (369,528).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturers of and dealers in chemical products and preparations, and minerals, plant, machinery, and things capable of being used in connection with metallurgical operations, extractors, pumpers, drawers, transporters and purifiers of and dealers in petroleum and other mineral oils, etc. Directors: Doreen G. Gibbons and Alfred J. White. Registered office: Alliance House, Caxton Street, S.W.1.

Meuko Manufacturing Co., Ltd. (369,653).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturing chemists, composition makers, dealers in chemicals, disinfectants, etc. Directors: S. M. Ellis and D. E. Ellis. Registered office: Meuko Works, 65a, St. Georges Road, Dorchester.

C. Gardner and Company, Ltd. (369,874).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of and dealers in chemicals, soldering and welding fluxes, etc. Directors: C. C. Gardner; Agnes M. P. Casey. Registered office: 329 High Street, Brentford, Middlesex.

Chemical and Allied Stocks and Shares

STOCK Exchange markets have continued to be dominated by the war news from Russia, and in most sections there has been a further reaction in values. This was, however, again moderate in character, and no heavy selling developed, although as was to be expected, demand was at a low level. In fact, markets generally displayed a fairly steady undertone, sentiment having been aided by the satisfactory trend in British Funds, which, following an earlier small reaction, were inclined to recover; it is realised that, as time proceeds, the large volume of money awaiting investment will be further increased by the decision to requisition South African loans. Whereas a short while ago the disposition in the market had been for buying to centre on shares of companies considered to have good prospects of recovery in dividend payments in the period of reconstruction following the war, the prevailing tendency now is to take a more cautious view and to favour shares of leading industrial undertakings, which are also considered to have satisfactory dividend prospects during the war. Consequently, shares of companies connected with the chemical and kindred industries have been relatively firm, although in some instances, owing to the trend on the Stock Exchange, prices are moderately lower on balance.

Imperial Chemical at 32s. 3d. were within 9d. of the level ruling a week ago, while at 33s. 3d. the 7 per cent. preference units were unchanged on balance. Business up to 64s. was recorded in B. Laporte; a larger capital ranks for dividend, but the market remains hopeful that the dividend is likely to be maintained, and is looking for the interim payment to be kept at 5 per cent. Lever and Unilever were reactionary with a decline from 27s. 3d. to 26s. 3d., and among other widely-held shares, Cerebos went back 2s. 6d. to £8½; but on the other hand, there was buying of Dunlop Rubber, which made the slightly higher price of 36s. 6d. The improved dividend was reflected by firmness in Erinoid 5s. ordinary shares, which were quoted around par, while shares of other companies associated with plastics were inclined to attract rather more attention; British Industrial Plastics 2s. shares transferred up to 3s. 3d. Results of the last-named company fall to be issued in November. Thos. De La Rue shares changed hands at 44s., and Lacrinoid Products 2s. shares were dealt in around their par value. Pending the forthcoming dividend decision, Imperial Smelting were steady at 12s. 3d., and elsewhere, General Refractories 10s. shares were quoted at 10s. 4½d. Borax Consolidated deferred units held their recent improvement to 28s. 9d. There were again a fair number of dealings in Barry and Staines, which were well maintained at 37s., and Nairn and Greenwich have remained at 61s. 3d. Moreover, in other directions, Lawes Chemical 10s. ordinary shares continued to be quoted at 7s. 6d. Results of the last-named company are due shortly. The 4s. ordinary shares of British Glues and Chemicals were again around 6s. Following an earlier reaction, Wall Paper Manufacturers deferred units showed a small improvement to 25s., while after a decline United Molasses rallied to 27s. 6d., which however, compared with 28s. 6d. a week ago. Elsewhere, Associated Cement, which were "ex" the interim dividend, were quoted at 51s. 3d. British Plaster Board at 16s. 9d. were within 3d. of the price ruling a week ago. Fison Packard were again 35s., while British Drug Houses shares, which remained firmly held, were unchanged at 23s. 9d.

Moderate declines were shown among iron and steel issues; Tube Investments were 92s. 6d., although the market continues to expect that the forthcoming announcement will show the maintenance of the dividend at 23¾ per cent. United Steel were 22s. 3d., and Dorman Long 22s. Results of the last-named company are due in December. Allied Ironfounders shares were less active and were quoted at 20s. 9d., while, elsewhere, Stewarts and Lloyds were 46s. 9d. Low Temperature Carbonisation 2s. ordinary units were firm at 1s. 4½d. on the improved profits shown by the results; the dividend is again 3½ per cent. Boots Drug ordinary units showed a steady tendency at 35s., and Sangers were 17s. Oil shares were reactionary, but there was a fair amount of speculative activity in some of the smaller-priced issues.